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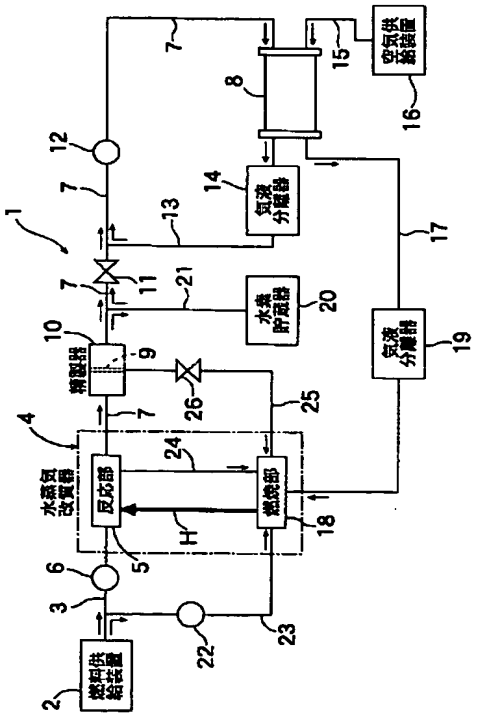
(54)【発明の名称】　燃料電池発電システム

(57)【要約】
【課題】　部品点数を減少して，構造の簡素化と共に，重量の軽減を図り，また改質器の応答遅れによる不具合を解消し，これにより車載用として好適な燃料電池発電システムを提供する。
【解決手段】　燃料電池発電システム１は，アルコール，ガソリン等の燃料から水素を生成する水蒸気改質器４と，その改質水素を精製するガス選択透過膜９と，その精製水素を供給される燃料電池８と，燃料電池８の運転休止中および精製水素の供給量が燃料電池８の要求水素量を上回ったときにおいて，精製水素を貯蔵する水素貯蔵器２０とを備える。水素貯蔵器２０は，燃料電池８の運転開始時および燃料電池８の要求水素量が水蒸気改質器４の水素生成量を上回ったとき水素を放出する。



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【特許請求の範囲】

【請求項１】　アルコール，ガソリン等の燃料から水素を生成する改質器（４）と，その改質水素を精製するガス選択透過膜（９）と，その精製水素を供給される燃料電池（８）と，前記燃料電池（８）の運転休止中および前記精製水素の供給量が前記燃料電池（８）の要求水素量を上回ったときにおいて，前記精製水素を貯蔵する水素貯蔵器（２０）とを備え，前記燃料電池（８）の運転開始時および前記燃料電池（８）の要求水素量が前記改質器（４）の水素生成量を上回ったとき，前記水素貯蔵器（２０）から水素を放出させることを特徴とする燃料電池発電システム。

【請求項２】　前記精製水素は純粋な水素である，請求項１記載の燃料電池発電システム。

【請求項３】　前記燃料電池（８）は，リン酸を含む耐熱性高分子膜（２８）を備え，そのリン酸がプロトン伝導の媒体をなす，請求項１または２記載の燃料電池発電システム。

【請求項４】　前記高分子膜（２８）はポリベンズイミダゾールより構成されている，請求項３記載の燃料電池発電システム。

【請求項５】　前記改質器（４）は水蒸気改質器である，請求項１，２，３または４記載の燃料電池発電システム。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は燃料電池発電システム，特に車載用として好適な前記システムに関する。

【０００２】

【従来の技術】従来，この種の燃料電池発電システムとしては，改質器によりアルコール，ガソリン等の燃料から水素を生成し，その改質水素を，燃料電池に供給するようにしたものが知られている。

【０００３】

【発明が解決しようとする課題】しかしながら改質水素にはＣＯ，CO_2，N_2，H_2O，未反応燃料等の不純物が含まれており，特に，ＣＯの被毒作用による燃料極の機能低下を防止すべく，ＣＯ除去処理のために，その処理装置を複数段に配置する必要がある等，従来システムは部品点数が多いため，構造が複雑であると共に重量も大となって車載用システムとしは不適当であった。

【０００４】一方，現状の改質器は，起動するまでの時間が長いため，燃料電池を電源とする車両においては始動スイッチを入れても直ちに発進することができず，また水素生成量増加の要求に対する応答性が鈍いため車両の加速性が悪い，といった問題があった。

【０００５】

【課題を解決するための手段】本発明は，改質水素をガス選択透過膜を用いて精製することにより，部品点数を減らして，構造を簡素化すると共に重量も小にし，また

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水素貯蔵器を備え，そこからの放出水素を燃料電池に供給し得るようにして改質器が持つ問題点を解決し，これにより車載用として好適な前記燃料電池発電システムを提供することを目的とする。

【０００６】前記目的を達成するため本発明によれば，アルコール，ガソリン等の燃料から水素を生成する改質器と，その改質水素を精製するガス選択透過膜と，その精製水素を供給される燃料電池と，前記燃料電池の運転休止中および前記精製水素の供給量が前記燃料電池の要求水素量を上回ったときにおいて，前記精製水素を貯蔵する水素貯蔵器とを備え，前記燃料電池の運転開始時および前記燃料電池の要求水素量が前記改質器の水素生成量を上回ったとき，前記水素貯蔵器から水素を放出させる燃料電池発電システムが提供される。

【０００７】ガス選択透過膜は，従来必須の複数のＣＯ処理装置に比べて小型であり，また複数段に設ける必要もない。これにより燃料電池発電システムにおいて，その部品点数を減少して構造の簡素化と共に，重量の軽減を図ることができる。

【０００８】一方，燃料電池の運転開始時には，水素貯蔵器からの放出水素のみを燃料電池に供給して，その運転を迅速に開始させることができる。この放出水素の供給は，燃料電池の運転開始時に同時に始動させた改質器が定常状態に到るまで行われる。燃料電池の要求水素量が改質器の水素生成量を上回ったときには，改質器からの改質水素，したがって精製水素に水素貯蔵器からの放出水素を加えて燃料電池に供給する。

【０００９】

【発明の実施の形態】図１に示す燃料電池発電システム１は車両に搭載される。そのシステム１において，燃料供給装置２が導管３を介し，改質器としての水蒸気改質器４における反応部５の導入側に接続され，その導管３に供給ポンプ６が配設される。反応部５の導出側は導管７を介し，燃料電池８の水素導入側に接続され，その導管７に水蒸気改質器４側より順次，ガス選択透過膜９を有する精製器１０，圧力調整機能を有する開閉弁１１および循環ポンプ１２が配設される。燃料電池８の水素導出側は導管１３を介し，開閉弁１１および循環ポンプ１２間において導管７に接続され，その燃料電池８からの導管１３に気液分離器１４が配設される。

【００１０】燃料電池８の空気導入側に導管１５を介して空気供給装置１６が接続され，その空気導出側は導管１７を介して水蒸気改質器４における燃焼部１８の導入側に接続される。その導管１７に気液分離器１９が配設される。精製器１０および開閉弁１１間において，導管７に水素貯蔵器２０が導管２１を介して接続される。燃料供給装置２および供給ポンプ６間において，導管３に，供給ポンプ２２を有する導管２３の一端が接続され，その他端は燃焼部１８の導入側に接続される。また反応部５および精製器１０の導出側が導管２４，２５を

介して燃焼部１８の導入側にそれぞれ接続され，精製器１０からの導管２５に開閉機能を有する背圧弁２６が配設される。この背圧弁２６は，反応部５から精製器１０に至るガス圧を保持するために設けられている。

【００１１】燃料供給装置２は燃料としてメタノールを貯蔵している。精製器１０のガス選択透過膜９は，例えばＰｄ－Ａｇ系合金（Ｐｄ単体も可）よりなり，水素は透過するが，不純物であるＣＯ，CO_2，N_2，H_2O，未反応メタノール等は透過しない，といった機能を有する。水素貯蔵器２０は，水素を吸蔵し，また放出することが可能な水素吸蔵合金，例えば$LaNi_5$を有する。

【００１２】図２において，燃料電池８は複数のセル２７を有し，各セル２７は，耐熱性高分子膜２８と，それを挟む（＋）空気極２９および（－）燃料極３０と，両電極２９，３０を挟む一対の拡散層３１と，両拡散層３１を挟む一対のセパレータ３２よりなり，各セパレータ３２は相隣る両セル２７において共用されている。各セル２７において，（＋）空気極２９側のセパレータ３２に存する複数の溝３３に空気が，また（－）燃料極３０側のセパレータ３２に在って前記溝３３と交差する関係の複数の溝３４に水素（燃料）がそれぞれ供給される。両拡散層３１は水素および空気を両極２９，３０に向けてそれぞれ拡散させる機能を有し，主に炭素繊維より構成される。各（＋）空気極２９および各（－）燃料極３０は黒鉛化炭素および触媒金属（例えばＰｔ）よりなり，また各セパレータ３２は黒鉛化炭素，ステンレス鋼（耐腐食性処理を施されたものを含む）等より構成される。

【００１３】耐熱性高分子膜２８は少なくとも窒素を含むヘテロ環構造を持つポリマ，例えばポリベンズイミダゾールより構成される。このような耐熱性高分子膜２８は米国特許第5,525,436 号明細書に開示されており，そこに開示された各種の耐熱性高分子膜が本発明において用いられる。

【００１４】前記耐熱性高分子膜２８は電極反応による温度上昇に十分に耐え得る。またリン酸としては，沸点の高い濃厚なもの（８５％以上）が用いられ，そのリン酸は前記温度上昇下においても高分子膜２８に保持されてプロトン伝導の媒体をなす。このような燃料電池８は小型・軽量化を図られており，またその動作温度を，例えば，最高２００℃程度に高めてその発生熱を有効に利用することが可能であるから，車載用として好適である。ただし，動作温度が２１０℃になると，リン酸は分解して酸化リンが生じる。

【００１５】〔Ｉ〕　翌朝において車両の走行を確実に開始させるためには，夜間駐車中であって，燃料電池８の運転休止中に次のような水素貯蔵作業を行う。即ち，開閉弁１１を閉じると共に背圧弁２６を所定の背圧が生じるように制御した状態において，燃料供給装置２のメタノールを供給ポンプ２２により水蒸気改質器４の燃焼部１８に供給してそれを作動させ，その発生熱Ｈにより水蒸気改質器４の反応部５を加熱して作動可能状態とする。また燃料供給装置２のメタノールを供給ポンプ６により水蒸気改質器４の反応部５に供給する。反応部５ではメタノールの水蒸気改質が行われ，圧力が０．５～０．６ＭＰａで，且つ不純物を含む水素が生成される。その改質水素は精製器１０に導入されて，ガス選択透過膜９により不純物を除去され，精製水素，この場合には純粋な水素が水素貯蔵器２０に導入されてその水素吸蔵合金に吸蔵される。この水素貯蔵器２０への水素の貯蔵は，その水素貯蔵器２０が充填状態となるまで行われる。

【００１６】ガス選択透過膜９による精製に当っては，所定のガス圧が必要であるが，水蒸気改質によれば前記のように０．５～０．６ＭＰａの改質水素が得られるので前記要求は十分に満たされる。

【００１７】〔II〕　車両の走行開始時，つまり燃料電池８の運転開始時には，開閉弁１１を開くと共に循環ポンプ１２を作動させ，水素貯蔵器２０から水素を放出させて燃料電池８に供給し，また空気を空気供給装置１６から燃料電池８に供給する。これにより燃料電池８が運転を開始して発電が行われ，この発電により車両が走行を開始する。未反応水素は，循環ポンプ１２により，気液分離器１４を経た後，再び燃料電池８の水素導入側に導かれて利用され，一方，未反応空気は気液分離器１９を経た後燃焼部１８に導入されて燃焼空気として利用される。水素貯蔵器２０からの放出水素の供給は燃料電池８の運転開始時に同時に始動させた水蒸気改質器４が定常状態に到るまで行われる。

【００１８】このように，燃料電池８の運転開始時には，水素貯蔵器２０より水素を放出させてその電池８に供給するようにしたので，水蒸気改質器４の応答遅れが生じていても燃料電池８の運転を確実に開始させることができ，延いては車両の走行をスムーズに，且つ迅速に開始させることが可能である。

【００１９】水蒸気改質器４が定常状態に到った後は反応部５で生成された水素が精製器１０，圧力調整機能を有する開閉弁１１および循環ポンプ１２を経て燃料電池８に導入されて発電が行われ，この発電により車両の走行が継続される。燃料電池８には純粋な水素が供給されるので発電効率の向上が図られ，また燃料電池８が低温である運転開始時において，水素に１０００ｐｐｍ程度のＣＯが含まれていると，その運転を開始させることができないが，この実施例においてはそのような不具合は生じない。

【００２０】〔III〕　車両の加速時において水蒸気改質器４の応答遅れにより，その改質器４の水素供給量が燃料電池８の要求水素量に満たなくなった場合には，水蒸気改質器４による水素供給量の不足分を水素貯蔵器２

０からの放出水素により充足する。一方，車両の減速時には，水蒸気改質器４の応答遅れによる余剰水素を水素貯蔵器２０に吸蔵させる。

【００２１】反応部５における過剰のメタノールおよび精製器１０で捕えられた未反応メタノールは，それぞれ導管２４，２５を介し水蒸気改質器４の燃焼部１８に導入されて燃料として利用される。

【００２２】なお，精製水素は純粋な水素である必要はなく，不具合を生じない程度に精製されていればよい。

【００２３】

【発明の効果】本発明によれば前記のように構成することにより，部品点数を減少して，構造の簡素化と共に，重量の軽減を図り，また改質器の応答遅れによる不具合を解消し，これにより車載用として好適な燃料電池発電システムを提供することができる。

【図面の簡単な説明】

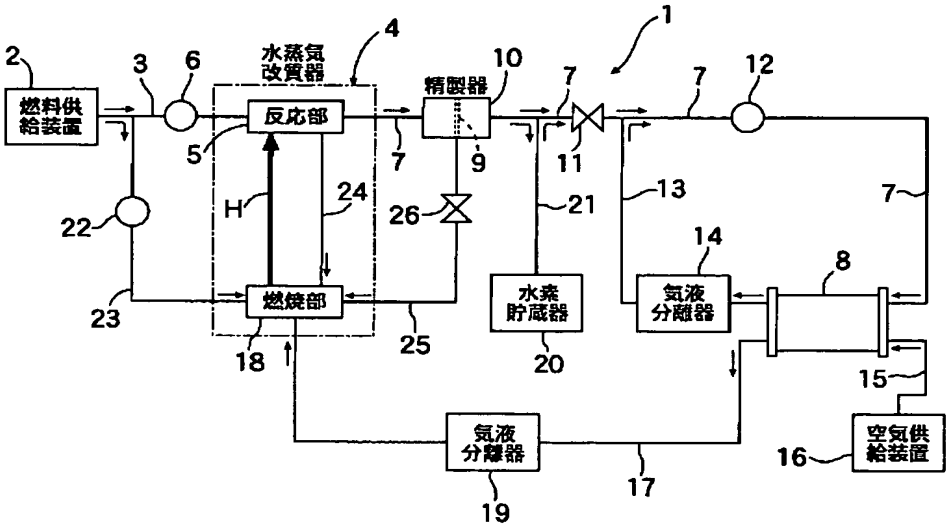
【図１】燃料電池発電システムのブロック図である。

【図２】一部を破断した燃料電池の要部正面図である。

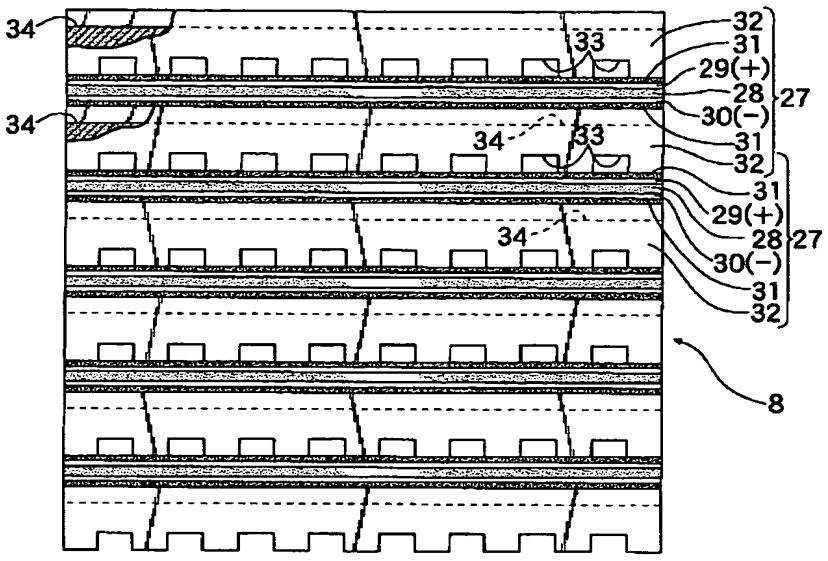
【符号の説明】

1	燃料電池発電システム
2	水蒸気改質器（改質器）
8	燃料電池
9	ガス選択透過膜
２０	水素貯蔵器
２８	高分子膜

【図１】



【図２】



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(71)Applicant : HONDA MOTOR CO LTD

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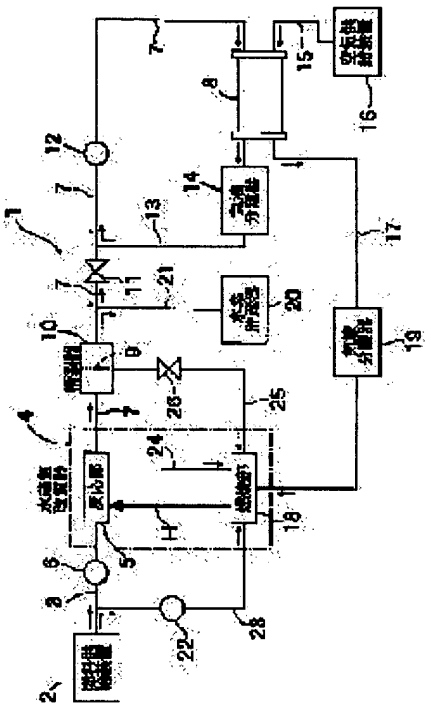
SATO SHUJI

(54) FUEL CELL GENERATING SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an on-vehicle suited fuel cell generating system by which is reduced in the number of parts, thus simplifying its structure and reducing its weight, and which removes nonconformities caused from a delay of response of a reforming unit.

SOLUTION: This fuel cell generating system 1 comprises a steam reforming unit 4 which generates hydrogen from fuel such as alcohol, gasoline or the like, a gas permselective membrane 9 to purify reformed hydrogen, a fuel cell 8 to be supplied with the purified hydrogen, and a hydrogen storage unit 20 which stores purified hydrogen when the fuel cell 8 is in non operation state and a volume of supply of the purified hydrogen exceeds a demand for hydrogen from the fuel cell. The hydrogen storage unit 20 discharges hydrogen when the fuel cell 8 starts to operate and the demand from the fuel cell 8 is larger in an amount of hydrogen than the generation of the steam reforming unit 4.



LEGAL STATUS

[Date of request for examination]

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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The reforming machine which generates hydrogen from fuels, such as alcohol and a gasoline, (4), [when the amount of supply of the inside of the outage of the gas permselective membrane (9) which refines the reforming hydrogen, the fuel cell (8) to which the purification hydrogen is supplied, and said fuel cell (8), and said purification hydrogen exceeds the amount of demand hydrogen of said fuel cell (8)] When it has the hydrogen reservoir (20) which stores said purification hydrogen and the time of the start up of said fuel cell (8) and the amount of demand hydrogen of said fuel cell (8) exceed the amount of hydrogen generation of said reforming machine (4), The fuel cell generation-of-electrical-energy system characterized by making hydrogen emit from said hydrogen reservoir (20).
[Claim 2] Said purification hydrogen is a fuel cell generation-of-electrical-energy system according to claim 1 which is pure hydrogen.
[Claim 3] Said fuel cell (8) is a fuel cell generation-of-electrical-energy system according to claim 1 or 2 by which it has the thermally stable polymer film (28) containing a phosphoric acid, and the phosphoric acid forms the medium of proton conduction.
[Claim 4] Said poly membrane (28) is a fuel cell generation-of-electrical-energy system according to claim 3 which consists of polybenzimidazoles.
[Claim 5] Said reforming machine (4) is a fuel cell generation-of-electrical-energy system according to claim 1, 2, 3, or 4 which is a steam-reforming machine.

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* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a fuel cell generation-of-electrical-energy system and said system suitable especially as an object for mount.
[0002]
[Description of the Prior Art] Conventionally, as this kind of a fuel cell generation-of-electrical-energy system, a reforming machine generates hydrogen from fuels, such as alcohol and a gasoline, and what supplied that reforming hydrogen to the fuel cell is known.
[0003]
[Problem(s) to be Solved by the Invention] however, it be necessary to arrange the processor to two or more steps for CO removal processing that impurities, such as CO, CO2, N2, H2 O, and an unreacted fuel, be contain in reforming hydrogen, and the depression of the fuel electrode by poisoning operation of CO should be prevent especially -- etc. -- since a system have many components mark, while its structure be conventionally complicated -- weight -- size -- become -- the system for mount -- carry out -- it be unsuitable.
[0004] On the other hand, since the present reforming machine had long time amount until it starts, even if it turned on the starting switch in the car which uses a fuel cell as a power source, it could not be immediately departed from it, and since the responsibility over a demand of the increment in the amount of hydrogen generation was blunt, it had the problem that the acceleration nature of a car was bad.
[0005]
[Means for Solving the Problem] This invention reduces components mark by refining reforming hydrogen using gas permselective membrane, it also makes weight smallness while it simplifies structure, and it is equipped with a hydrogen reservoir, solves the trouble that a reforming machine has it as the emission hydrogen from there can be supplied to a fuel cell, and aims at this offering said fuel cell generation-of-electrical-energy system suitable as an object for mount.
[0006] The reforming machine which generates hydrogen from fuels, such as alcohol and a gasoline, according to this invention in order to attain said purpose, [when the amount of supply of the inside of the outage of the gas permselective membrane which refines the reforming hydrogen, the fuel cell to which the purification hydrogen is supplied, and said fuel cell, and said purification hydrogen exceeds the amount of demand hydrogen of said fuel cell] When it has the hydrogen reservoir which stores said purification hydrogen and the time of the start up of said fuel cell and the amount of demand hydrogen of said fuel cell exceed the amount of hydrogen generation of said reforming machine, the fuel cell generation-of-electrical-energy system to which hydrogen is made to emit from said hydrogen reservoir is offered.
[0007] Gas permselective membrane is conventionally small compared with two or more indispensable CO processors, and it is not necessary to prepare it in two or more steps. Thereby, in a fuel cell generation-of-electrical-energy system, the components mark can be decreased and mitigation of weight can be aimed at with the simplification of structure.
[0008] On the other hand, only the emission hydrogen from a hydrogen reservoir can be supplied to a fuel cell, and the operation can be made to start quickly at the time of the start up of a fuel cell. Supply of this emission hydrogen is performed until the reforming machine which coincidence was made to put into operation at the time of the start up of a fuel cell results in a steady state. When the amount of demand hydrogen of a fuel cell exceeds the amount of hydrogen generation of a reforming machine, the emission hydrogen from a hydrogen reservoir is added to reforming hydrogen, therefore purification hydrogen from a reforming machine, and a fuel cell is supplied.
[0009]

[Embodiment of the Invention] The fuel cell generation-of-electrical-energy system 1 shown in drawing 1 is carried in a car. In the system 1, a fuel supply system 2 is connected to the installation side of the reaction section 5 in the steam-reforming machine 4 as a reforming machine through a conduit 3, and a feed pump 6 is arranged by the conduit 3. The derivation side of the reaction section 5 is connected to the hydrogen installation side of a fuel cell 8 through a conduit 7, and the purification machine 10 which has the gas permselective membrane 9 one by one from the steam-reforming machine 4 side in the conduit 7, the closing motion valve 11 which has a pressure regulation function, and a circulating pump 12 are arranged. Through a conduit 13, between the closing motion valve 11 and a circulating pump 12, it connects with a conduit 7 and, in the hydrogen derivation side of a fuel cell 8, the vapor-liquid-separation machine 14 is arranged by the conduit 13 from the fuel cell 8.

[0010] Air supply equipment 16 is connected to the air installation side of a fuel cell 8 through a conduit 15, and the air derivation side is connected to the installation side of the combustion section 18 in the steam-reforming machine 4 through a conduit 17. The vapor-liquid-separation machine 19 is arranged by the conduit 17. The hydrogen reservoir 20 is connected to a conduit 7 through a conduit 21 between the purification machine 10 and the closing motion valve 11. The end of the conduit 23 which has a feed pump 22 in a conduit 3 between a fuel supply system 2 and a feed pump 6 is connected, and the other end is connected to the installation side of the combustion section 18. Moreover, the derivation side of the reaction section 5 and the purification machine 10 is connected to the installation side of the combustion section 18 through conduits 24 and 25, respectively, and the back-pressure valve 26 which has a closing motion function from the purification machine 10 to a conduit 25 is arranged. This back-pressure valve 26 is formed in order to hold the gas pressure from the reaction section 5 to the purification machine 10.

[0011] The fuel supply system 2 has stored the methanol as a fuel. The gas permselective membrane 9 of the purification machine 10 has the function in which CO and CO2 which are an impurity, N2, H2 O, an unreacted methanol, etc. are not penetrated although it consists of a Pd-Ag system alloy (Pd simple substance is also good) and hydrogen is penetrated. The hydrogen reservoir 20 is the hydrogen storing metal alloy 5 which occlusion of the hydrogen is carried out and can emit it, for example, LaNi. It has.

[0012] drawing 2 -- setting -- a fuel cell -- eight -- plurality -- a cel -- 27 -- having -- each -- a cel -- 27 -- a thermally stable polymer -- the film -- 28 -- it -- inserting -- (-- + --) -- an air pole -- 29 -- and -- (-) -- a fuel electrode -- 30 -- two electrodes -- 29 -- 30 -- inserting -- a pair -- a diffusion layer -- 31 -- both -- a diffusion layer -- 31 -- inserting -- a pair -- a separator -- 32 -- becoming -- each -- a separator -- 32 -- adjacency -- **** -- a cel -- 27 -- setting -- using in common -- having -- **** . In each cel 27, hydrogen (fuel) is supplied to two or more slots 34 on the relation into which air is in the separator 32 by the side of the (-) fuel electrode 30 in again, and intersects said slot 33 in two or more slots 33 which consist in the separator 32 by the side of the (+) air pole 29, respectively. Both the diffusion layers 31 have the function to turn hydrogen and air to two poles 29 and 30, and to diffuse them, respectively, and mainly consist of carbon fibers. The ** (+) air pole 29 and the ** (-) fuel electrode 30 consist of graphitized carbon and a catalyst metal (for example, Pt), and each separator 32 consists of graphitized carbon, stainless steel (that to which corrosion resistance processing was performed is included), etc.

[0013] The thermally stable polymer film 28 consists of polymers with the heterocycle structure which contains nitrogen at least, for example, polybenzimidazole. Such thermally stable polymer film 28 is indicated by the U.S. Pat. No. 5,525,436 specification, and various kinds of thermally stable polymer film indicated there is used in this invention.

[0014] Said thermally stable polymer film 28 can fully be equal to the temperature rise by electrode reaction. Moreover, as a phosphoric acid, the thick high thing (85% or more) of the boiling point is used, and under said temperature rise, the phosphoric acid is held at a poly membrane 28, and forms the medium of proton conduction. Since small and lightweight-ization are attained, and the operating temperature is raised to about a maximum of 200 degrees C and such a fuel cell 8 can use the generating heat effectively, it is suitable as an object for mount. However, if operating temperature becomes 210 degrees C, it will decompose and phosphorus oxide will produce a phosphoric acid.

[0015] [I] It is [Nighttime] under parking, and in order to make transit of a car start certainly in the next morning, the following hydrogen storage activities are done into the outage of a fuel cell 8. That is, while closing the closing motion valve 11, in the condition of having controlled so that predetermined back pressure produced a back-pressure valve 26, the methanol of a fuel supply system 2 is supplied to the combustion section 18 of the steam-reforming machine 4 by the feed pump 22, it is operated, the reaction section 5 of the steam-reforming machine 4 is heated with the generating heat H, and it considers as ready condition. Moreover, the methanol of a fuel supply system 2 is supplied to the reaction section 5 of the steam-reforming machine 4 by the feed pump 6. In the reaction section 5, steam reforming of a methanol is performed and the hydrogen which a pressure is 0.5-0.6MPa and contains an impurity is generated. That reforming hydrogen is introduced into the purification machine 10, the gas permselective membrane 9 removes an impurity, purification hydrogen and hydrogen pure in this case are introduced into the hydrogen reservoir 20, and

occlusion of it is carried out to that hydrogen storing metal alloy. Storage of the hydrogen to this hydrogen reservoir 20 is performed until that hydrogen reservoir 20 will be in a restoration condition.

[0016] In purification by the gas permselective membrane 9, although predetermined gas pressure is required, since the reforming hydrogen of 0.5-0.6MPa is obtained as mentioned above according to steam reforming, said demand is fully filled.

[0017] [II] While opening the closing motion valve 11, operate a circulating pump 12, and hydrogen is made to emit from the hydrogen reservoir 20 at the time of transit initiation of a car, i.e., the start up of a fuel cell 8, and a fuel cell 8 is supplied, and air is supplied to a fuel cell 8 from air supply equipment 16. A fuel cell 8 starts operation by this, a generation of electrical energy is performed and a car starts transit by this generation of electrical energy. By the circulating pump 12, after unreacted hydrogen passes through the vapor-liquid-separation machine 14, it is again drawn and used for the hydrogen installation side of a fuel cell 8, and on the other hand, after unreacted air passes through the vapor-liquid-separation machine 19, it is introduced into the combustion section 18 and used as a combustion air. Supply of the emission hydrogen from the hydrogen reservoir 20 is performed until the steam-reforming machine 4 which coincidence was made to put into operation at the time of the start up of a fuel cell 8 results in a steady state.

[0018] Thus, since hydrogen is made to emit from the hydrogen reservoir 20 at the time of the start up of a fuel cell 8 and it was made to supply the cell 8, it is possible to be able to make operation of a fuel cell 8 start certainly, even if the response delay of the steam-reforming machine 4 has arisen, as a result to make transit of a car start smoothly and quickly.

[0019] After the steam-reforming machine 4 results in a steady state, the hydrogen generated in the reaction section 5 is introduced into a fuel cell 8 through the closing motion valve 11 and circulating pump 12 which have the purification machine 10 and a pressure regulation function, a generation of electrical energy is performed, and transit of a car is continued by this generation of electrical energy. Although that operation cannot be made to start if improvement in generating efficiency is achieved and about 1000 ppm CO is contained in hydrogen at the time of the start up whose fuel cell 8 is low temperature, since pure hydrogen is supplied to a fuel cell 8, such fault is not produced in this example.

[0020] [III] When the hydrogen amount of supply of the reforming machine 4 stops fulfilling the amount of demand hydrogen of a fuel cell 8 according to the response delay of the steam-reforming machine 4 at the time of acceleration of a car, the insufficiency of the hydrogen amount of supply with the steam-reforming machine 4 is satisfied by the emission hydrogen from the hydrogen reservoir 20. On the other hand, at the time of moderation of a car, occlusion of the surplus hydrogen by the response delay of the steam-reforming machine 4 is carried out to the hydrogen reservoir 20.

[0021] The unreacted methanol caught with the superfluous methanol and the purification machine 10 in the reaction section 5 is introduced into the combustion section 18 of the steam-reforming machine 4 through conduits 24 and 25, respectively, and is used as a fuel.

[0022] In addition, purification hydrogen does not need to be pure hydrogen and should just be refined by extent which does not produce fault.

[0023]

[Effect of the Invention] According to this invention, by constituting as mentioned above, components mark can be decreased, and mitigation of weight can be aimed at with the simplification of structure, and the fault by the response delay of a reforming machine can be canceled, and, thereby, a fuel cell generation-of-electrical-energy system suitable as an object for mount can be offered.

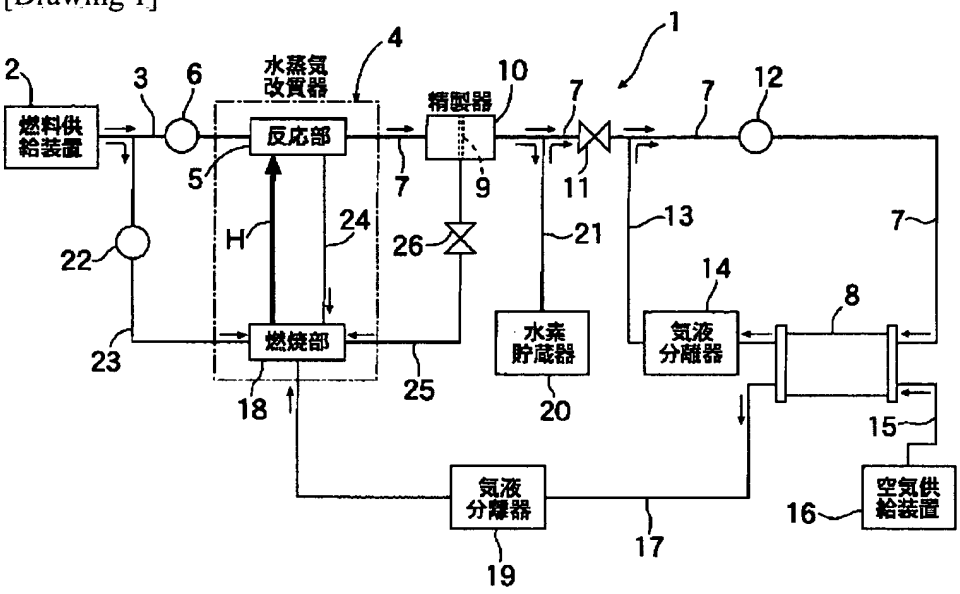
[Translation done.]

* NOTICES *

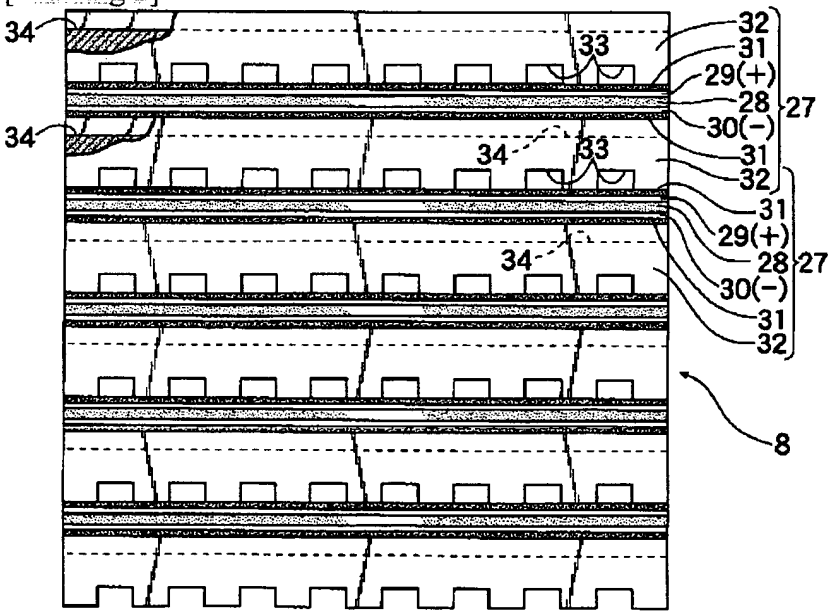
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



[Drawing 2]



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